

On the Spectra of Certain Stars (Second communication).

By the Rev. T. E. Espin, M.A.

(1) DM + 49° 41. R.A. 0^h 12^m.2. Decl. + 49° 44' (1900). Mag. 9.0. The spectrum of this star was found to be IV. type at Harvard. As this star has not been observed visually, as far as I am aware, it was looked up Dec. 11, and found to be fine red, Spectrum IV.!! The bands are very well seen. Mag. 8.6.

(2) Anonymous. R.A. 0^h 16^m.8. Decl. + 58° 36' (1900). A star found October 8, not in Argelander. The colour is fine red, and the spectrum banded, but too faint to be sure whether it is type III. or type IV. As it was not in Argelander, and not recorded in previous sweeps, it has been watched for variation. The following are the observations of it:—

October 8, Mag. 10.0.

October 11, Mag. 9.7.

October 19, Mag. 9.7.

December 30, Mag. 9.5.

The star may therefore have brightened slightly.

(3) Anonymous. R.A. 2^h 10^m.0. Decl. + 58° 3' (1900). Found December 11. Not in Argelander. Mag. 9.0. Pale red. Spectrum III. type. The comparison of photographs 1893 January 20, 26, December 12, shows no variation.

(4) *T Persei*. R.A. 2^h 12^m.2. Decl. + 58° 59' (1900). As this star has not been observed with the spectroscope, it was set for on December 11, and found to be mag. 8.6. Colour red. Spectrum III.!!! The bands are large, but not deep. The spectrum is similar to many stars in this region. I have found no part of the heavens where so many red stars are congregated. If a circle with about 1° radius is drawn with centre R.A. 2^h 10^m, Decl. 57° 25' (1855), it will include fourteen stars of type III.

(5) DM + 56° 731. R.A. 2^h 44^m.8. Decl. + 56° 32' (1900). Mag. 9.5. This is a star of type V. discovered by photography at Harvard. I have observed it on several occasions, and it always appeared to have a monochromatic spectrum. On December 11 I reobserved it. There is a very faint continuous spectrum. Calling the total light of the star 10, the bright line at or near F would equal 9, the continuous spectrum 1. There is also an inequality in the spectrum, probably the usual one at 540. The bright line is remarkably vivid, and appears to project beyond the spectrum. Whether this is due to irradiation or actual projection I am unable to tell.

(6) DM + 61° 734. R.A. 4^h 40^m.1. Decl. + 61° 0' (1900). Mag. 7.7. This star was discovered by Mr. Gage with his 15-inch reflector at Wolsingham. He informed me that it had a fine III.-type spectrum. It was observed by me 1894 Jan. 7, and found to be mag. 7.5. Colour orange red. Spectrum

III.!!! The spectrum is normal; all Dunér's bands are seen. The bands at the violet end are intense, and the spectrum here is discontinuous.

(7) Var. R.A. $19^h 9^m.6$. Decl. $49^\circ 29'$ (1900). A star not in Argelander. Announced as variable by Deichmüller (*A.N.* 3191). Observed December 14 in moonlight as 8.8 mag. Colour red. Spectrum III.!! Faint in moonlight. The bands seem to be deep in the violet end, and the spectrum is here discontinuous. When the spectrum is brought to a line, it is beaded with bright dots.

(8) DM + $24^\circ 39'02$. R.A. $19^h 46^m.3$. Decl. + $24^\circ 41'$ (1900). Mag. 9.2. First seen October 11. Mag. 8.7. Very red; banded spectrum. I think III. November 13, 8.9 mag.

(9) χ *Cygni*. R.A. $19^h 46^m.7$. Decl. + $32^\circ 40'$ (1900). August 12, mag. 9.0. Perfectly discontinuous III.-type spectrum. There seems to be nothing but a few bright isolated bands. Colour very red. August 14, mag 9.1; very red. The spectrum quite discontinuous; one bright band stands out near centre of the spectrum far brighter than the rest; others are, however, seen. Allowing for the faintness of the light, the spectrum seems similar to what it is at maximum.

(10) Var. R.A. $20^h 47^m.4$. Decl. + $45^\circ 50'$ (1900). An anonymous star, announced as variable by Wolf. December 9, mag. 9.0; red. There are bands, and I think they are those of type III.

(11) *Es. Birm.* 696 = DM + $45^\circ 33'49$. R.A. $20^h 54^m.5$. Decl. + $46^\circ 5'$ (1900). Mag. 8.1. My observations of the spectrum of this star differ strangely. 1888 May 4 I noted that the blue and violet are singularly faint, and the spectrum very unpronounced for so finely coloured a star, sometimes thought to be III., sometimes IV. May 9, III.! 1891 October 2, III.!!! November 26, III. 1893 September 9, III.!! There is no doubt about the spectrum; the bands are large and faint. The photographs suggest unsteadiness of light. My observations of the magnitude are—

1885 December 15, 25, 8.0 mag.
 1886 January 15, June 30, August 20, 8.0 mag.
 1891 October 2, 8.5 mag.
 1891 November 26, 8.3 mag.
 1893 September 9, 7.6 mag.
 1893 September 11, 8.0 mag.
 1893 September 12, 8.2 mag.
 1893 September 14, 8.1 mag.
 1893 September 16, 8.2 mag.
 1893 September 19, 8.2 mag.
 1893 September 27, 8.3 mag.
 1893 November 13, 8.2 mag.

The variation seems very doubtful.

(12) DM + $57^{\circ}2487$. R.A. $22^{\text{h}}10^{\text{m}}5$. Decl. + $57^{\circ}31'$ (1900). Mag. 9.1. October 6, mag. 9.0; very red; the bands are very large, and at first it was thought to be IV., but afterwards I was convinced that it was III.!!! The spectrum is quite discontinuous, and some of the bands are of unusual size.

Some Nebulous Objects not in the New General Catalogue of Nebulæ. By the Rev. T. E. Espin, M.A.

While sweeping for red stars I have encountered various nebulous objects. These have been carefully marked on the chart of Argelander of that region, estimating their position from the neighbouring stars. Most of these were subsequently found in the New G.C. of Nebulæ. The following are, however, new. In several cases they are partially resolved, and may really be gatherings of very faint stars. The places which are approximate only, but which are probably correct to within 10^{s} of R.A. and $3'$ of Decl., have been brought up to 1860.

- (1) R.A. $19^{\text{h}}16^{\text{m}}33^{\text{s}}$ Decl. + $20^{\circ}29'$. Probably a cluster of very faint stars. October 8.
- (2) R.A. $19^{\text{h}}30^{\text{m}}46^{\text{s}}$ Decl. + $40^{\circ}44'$. Faint nebulosity. October 6.
- (3) R.A. $19^{\text{h}}33^{\text{m}}8^{\text{s}}$ Decl. + $19^{\circ}54'$. Very faint, extending N.P. from a 9.5 mag. star. October 8.
- (4) R.A. $19^{\text{h}}36^{\text{m}}43^{\text{s}}$ Decl. + $37^{\circ}19'$. Nebula round a group of faint stars. September 16.
- (5) R.A. $19^{\text{h}}37^{\text{m}}5^{\text{s}}$ Decl. + $27^{\circ}10'$. While sweeping on September 14 I suddenly came upon a dark space. On carefully examining the field there is evidently a large faint nebulosity, mixed up with stars, sharply defined on *f* side, stretching N. and S. Max Wolf's photograph shows this nebulosity.
- (6) R.A. $20^{\text{h}}4^{\text{m}}43^{\text{s}}$ Decl. + $34^{\circ}33'$. Faint nebulosity. September 19.
- (7) R.A. $20^{\text{h}}6^{\text{m}}0^{\text{s}}$ Decl. + $40^{\circ}46'$. Extremely faint nebula within a circle of bright stars. October 6.
- (8) R.A. $20^{\text{h}}11^{\text{m}}42^{\text{s}}$ Decl. + $24^{\circ}45'$. Large, misty patch, partly resolved. October 8.
- (9) R.A. $21^{\text{h}}5^{\text{m}}39^{\text{s}}$ Decl. + $46^{\circ}17'$. Faint, extending N. from DM + $46^{\circ}3214$, 9.4 mag. September 9.
- (10) R.A. $21^{\text{h}}7^{\text{m}}12^{\text{s}}$ Decl. + $47^{\circ}11'$. Faint, large, many small stars. September 9.
- (11) R.A. $21^{\text{h}}18^{\text{m}}44^{\text{s}}$ Decl. + $54^{\circ}51'$. Faint, diffused, some faint stars. September 16.
- (12) R.A. $21^{\text{h}}39^{\text{m}}19^{\text{s}}$ Decl. + $52^{\circ}18'$. Misty patch, partly resolved. September 16.